

Amndt. dated November 9, 2004
Reply to Office action of Sept. 9, 2004

Serial No. 09/535,859
Docket No. BLD990050US1
Firm No. 0036.0060

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (Currently Amended) A method for reducing toner in an image comprised of raster pel data, comprising:
 - determining surrounding pels of subject pels;
 - for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel, wherein the charged sub-pel region is less than a region of the subject pel; and
 - for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel.
2. (Original) The method of claim 1, wherein toner is attracted to the charged sub-pel region.
3. (Previously Presented) A method for reducing toner in an image comprised of raster pel data, comprising:
 - determining surrounding pels of subject pels;
 - for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and
 - for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the position information clusters the sub-pel region of adjacent pels in order to reduce electromagnetic radiation.
4. (Original) The method of claim 1, further comprising:
 - for each subject pel, determining whether the pattern of the surrounding pels indicates that the subject pel is in a black filled region, wherein the position information is used to align

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the sub-pel region in the subject pel in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

5. (Original) The method of claim 4, wherein the alignment of the sub-pels forms a checkerboard pattern.

6. (Previously Presented) A method for reducing toner in an image comprised of raster pel data, comprising:

determining surrounding pels of subject pels;

for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and

for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the sub-pulse width power and position information is encoded in a look-up table that provides one output sub-pulse width power and position information for an input subject pel and surrounding pel pattern.

7. (Currently Amended) The method of claim [[4]] 3, wherein the surrounding pels include pels from the scan line including the subject pel and from scan lines adjacent to the subject pel, wherein the subject pel is in the black filled region if a plurality of the surrounding pels are all black.

8. (Original) The method of claim 7, wherein the subject pel is in the black filled region if the plurality of the pels that surround the subject pel that are all black form a cross shape.

9. (Original) The method of claim 7, wherein the surrounding pels and subject pel form a data window of pels, further comprising:

encoding pel positions in the data window to include location information of the subject pel with respect to other pels if the subject pel is in one black filled region; and

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using the position information to align the sub-pel regions in the subject pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

10. (Original) The method of claim 9, wherein the data window forms a diamond shape with the subject pel at the center of the diamond shaped window.

11. (Original) The method of claim 9, wherein the sub-pulse width power and position information are encoded in a look-up table that provides one output value including sub-pulse width power and position information for an input subject pel and surrounding pel pattern, and wherein the look-up table is encoded to provide the position information that is used to align sub-pel regions in pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel for input data windows that are encoded with position information.

12. (Original) The method of claim 7, wherein the surrounding pels and subject pel form a data window of pels, further comprising, for each subject pel:

determining from the pels in the data window whether the subject pel is on an edge of an image of black pels; and

using the data window as input to a look-up table that provides one output sub-pulse width power and position information for different input data window patterns including patterns that indicate that the subject pel is in one black filled region or on one image edge.

13. (Original) The method of claim 12, wherein the look-up table is encoded to align pels on the edge toward the black filled region.

14. (Original) The method of claim 12, wherein the look-up table is encoded to provide a sub-pulse width power level for pels on the edge that is less than the sub-pulse width power level for pels in the black filled region.

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15. (Currently Amended) A system for reducing toner in an image comprised of raster pel data, comprising:

means for determining surrounding pels of subject pels;

means for generating, for each subject pel, a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel, wherein the charged sub-pel region is less than a region of the subject pel; and

means for generating, for each subject pel, position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel.

16. (Original) The system of claim 15, wherein toner is attracted to the charged sub-pel region.

17. (Previously Presented) A system for reducing toner in an image comprised of raster pel data, comprising:

means for determining surrounding pels of subject pels;

means for generating, for each subject pel, a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and

means for generating, for each subject pel, position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the position information clusters the sub-pel region of adjacent pels in order to reduce electromagnetic radiation.

18. (Original) The system of claim 16, further comprising:

means for determining, for each subject pel, whether the pattern of the surrounding pels indicates that the subject pel is in a black filled region, wherein the position information is used to align the sub-pel region in the subject pel in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

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19.. (Original) The system of claim 18, wherein the alignment of the sub-pels forms a checkerboard pattern.

20. (Previously Presented) A system for reducing toner in an image comprised of raster pel data, comprising:

means for determining surrounding pels of subject pels;

means for generating, for each subject pel, a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and

means for generating, for each subject pel, position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the sub-pulse width power and position information is encoded in a look-up table that provides one output sub-pulse width power and position information for an input subject pel and surrounding pel pattern.

21. (Original) The system of claim 17, wherein the surrounding pels include pels from the scan line including the subject pel and from scan lines adjacent to the subject pel, wherein the subject pel is in the black filled region if a plurality of the surrounding pels are all black.

22. (Original) The system of claim 21, wherein the subject pel is in the black filled region if the plurality of the pels that surround the subject pel that are all black form a cross shape.

23. (Original) The system of claim 21, wherein the surrounding pels and subject pel form a data window of pels, further comprising:

means for encoding pel positions in the data window to include location information of the subject pel with respect to other pels if the subject pel is in one black filled region; and

means for using the position information to align the sub-pel regions in the subject pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

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24. (Original) The system of claim 23, wherein the data window forms a diamond shape with the subject pel at the center of the diamond shaped window.

25. (Original) The system of claim 23, whercin the sub-pulse width power and position information are encoded in a look-up table that provides one output value including sub-pulse width power and position information for an input subject pel and surrounding pel pattern, and wherein the look-up table is encoded to provide the position information that is used to align sub-pel regions in pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel for input data windows that are encoded with position information.

26. (Original) The system of claim 21, wherein the surrounding pels and subject pel form a data window of pels, further comprising, for each subject pel:

means for determining from the pels in the data window whether the subject pel is on an edge of an image of black pels; and

means for using the data window as input to a look-up table that provides one output sub-pulse width power and position information for different input data window patterns including patterns that indicate that the subject pel is in one black filled region or on one image edge.

27. (Original) The system of claim 26, wherein the look-up table is encoded to align pels on the edge toward the black filled region.

28. (Original) The system of claim 26, whercin the look-up table is encoded to provide a sub-pulse width power level for pels on the edge that is less than the sub-pulse width power level for pels in the black filled region.

29. (Previously Presented) A computer-readable transmission medium including a look-up table data structure used for reducing toner in an image comprised of raster pel data, comprising:

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a plurality of output values, wherein one output value is provided for at least one pattern of pels including a subject pel, wherein the output value is substituted for the subject pel, and wherein the output value comprises a sub-pulse width power to charge a sub-pel region within the subject pel, wherein the charged sub-pel region is less than a region of the subject pel, and position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel.

30. (Original) The computer-readable transmission medium of claim 29, wherein toner is attracted to the charged sub-pel region.

31. (Original) The computer-readable transmission medium of claim 29, wherein the position information clusters the sub-pel region of adjacent pels in order to reduce electromagnetic radiation.

32. (Original) The computer-readable transmission medium of claim 29, wherein the output values for subject pels in a black filled region include position information that aligns the sub-pel region in the subject pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

33. (Previously Presented) A computer-readable transmission medium including a look-up table data structure used for reducing toner in an image comprised of raster pel data, comprising:

a plurality of output values, wherein one output value is provided for at least one pattern of pels including a subject pel, wherein the output value is substituted for the subject pel, and wherein the output value comprises a sub-pulse width power to charge a sub-pel region within the subject pel and position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, wherein the output values for subject pels in a black filled region include position information that aligns the sub-pel region in the subject pels in the black filled region to

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be adjacent to the sub-pel region in one adjacent subject pel in the black filled region, and wherein the position information for the output values of subject pels in the black filled region aligns the sub-pel regions to form a checkerboard pattern.

34. (Original) The computer-readable transmission medium of claim 33, wherein the subject pels are in the black filled region if a plurality of the surrounding pels are all black.

35. (Original) The computer-readable transmission medium of claim 34, wherein the subject pel is in the black filled region if the plurality of the pels that surround the subject pel that are all black form a cross shape.

36. (Previously Presented) A computer-readable transmission medium including a look-up table data structure used for reducing toner in an image comprised of raster pel data, comprising:

a plurality of output values, wherein one output value is provided for at least one pattern of pels including a subject pel, wherein the output value is substituted for the subject pel, and wherein the output value comprises a sub-pulse width power to charge a sub-pel region within the subject pel and position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the surrounding pels for which an output value is provided in the look-up table data structure form a diamond shape with the subject pel at the center of the diamond shaped window.

37. (Original) The computer-readable transmission medium of claim 29, wherein the output values for subject pels on an image edge are encoded with position information to align the subject pels on the image edge toward a black filled region.

38. (Original) The computer-readable transmission medium of claim 29, wherein the output values for subject pels on the image edge are encoded with a sub-pulse width power level that is less than the sub-pulse width power level for pels in the black filled region.

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39. (Currently Amended) An article of manufacture for reducing toner in an image comprised of raster pel data, wherein the article of manufacture causes operations to be performed, the operations comprising:

determining surrounding pels of subject pels;

for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel, wherein the charged sub-pel region is less than a region of the subject pel; and

for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel.

40. (Previously Presented) The article of manufacture of claim 39, wherein toner is attracted to the charged sub-pel region.

41. (Previously Presented) An article of manufacture for reducing toner in an image comprised of raster pel data, wherein the article of manufacture causes operations to be performed, the operations comprising:

determining surrounding pels of subject pels;

for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and

for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the position information clusters the sub-pel region of adjacent pels in order to reduce electromagnetic radiation.

42. (Previously Presented) The article of manufacture of claim 39, wherein the operations further comprise:

for each subject pel, determining whether the pattern of the surrounding pels indicates that the subject pel is in a black filled region, wherein the position information is used to align

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the sub-pel region in the subject pel in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

43. (Previously Presented) The article of manufacture of claim 42, wherein the alignment of the sub-pels forms a checkerboard pattern.

44. (Previously Presented) An article of manufacture for reducing toner in an image comprised of raster pel data, wherein the article of manufacture causes operations to be performed, the operations comprising:

determining surrounding pels of subject pels;

for each subject pel, generating a sub-pulse width power to charge a sub-pel region within the subject pel based on a pattern of the surrounding pels of the subject pel; and

for each subject pel, generating position information indicating an alignment of the sub-pel region in the pel, wherein the position information is used to position the sub-pel region produced by the sub-pulse width power in the pel, and wherein the sub-pulse width power and position information is encoded in a look-up table that provides one output sub-pulse width power and position information for an input subject pel and surrounding pel pattern.

45. (Previously Presented) The article of manufacture of claim 42, wherein the surrounding pels include pels from the scan line including the subject pel and from scan lines adjacent to the subject pel, wherein the subject pel is in the black filled region if a plurality of the surrounding pels are all black.

46. (Previously Presented) The article of manufacture of claim 45, wherein the subject pel is in the black filled region if the plurality of the pels that surround the subject pel that are all black form a cross shape.

47. (Previously Presented) The article of manufacture of claim 45, wherein the surrounding pels and subject pel form a data window of pels, further comprising:

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encoding pel positions in the data window to include location information of the subject pel with respect to other pels if the subject pel is in one black filled region; and

using the position information to align the sub-pel regions in the subject pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel in the black filled region.

48. (Previously Presented) The article of manufacture of claim 47, wherein the data window forms a diamond shape with the subject pel at the center of the diamond shaped window.

49. (Previously Presented) The article of manufacture of claim 47, wherein the sub-pulse width power and position information are encoded in a look-up table that provides one output value including sub-pulse width power and position information for an input subject pel and surrounding pel pattern, and wherein the look-up table is encoded to provide the position information that is used to align sub-pel regions in pels in the black filled region to be adjacent to the sub-pel region in one adjacent subject pel for input data windows that are encoded with position information.

50. (Previously Presented) The article of manufacture of claim 45, wherein the surrounding pels and subject pel form a data window of pels, further comprising, for each subject pel:

determining from the pels in the data window whether the subject pel is on an edge of an image of black pels; and

using the data window as input to a look-up table that provides one output sub-pulse width power and position information for different input data window patterns including patterns that indicate that the subject pel is in one black filled region or on one image edge.

51. (Previously Presented) The article of manufacture of claim 50, wherein the look-up table is encoded to align pels on the edge toward the black filled region.

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52. (Previously Presented) The article of manufacture of claim 50, wherein the look-up table is encoded to provide a sub-pulse width power level for pels on the edge that is less than the sub-pulse width power level for pels in the black filled region.